DOCUMENT RESUME

ED 457 748 HE 034 401

AUTHOR Watt, Catherine E.; Chrestman, Ronnie E.; Johnston, Brian A.
TITLE The Role of Institutional Research in Space Planning: Helping All the Pieces Fit Together. AIR 2001 Annual Forum Paper.
PUB DATE 2001-06-00
NOTE 20p.; Paper presented at the Annual Meeting of the Association for Institutional Research (41st, Long Beach, CA, June 3-6, 2001).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Administrators; Classrooms; *College Faculty; Databases; *Educational Facilities Planning; Higher Education; *Institutional Research; Needs Assessment; Research Universities; *Resource Allocation; Teacher Attitudes
IDENTIFIERS *Clemson University SC

ABSTRACT

A 2-year, and still ongoing, initiative was implemented at a land-grant research university to analyze academic and administrative space. Administrative attitudes were compared with faculty attitudes related to space priorities as part of the university's 10-year comprehensive plan. The Office of Institutional Research (OIR) served as the central point for quantitative information for the university and was central to the study of space distribution. Graduate assistants and staff visually and physically assessed every building on campus to verify the accuracy of past data collections and the existing facilities database. Information was also gathered from individual departments for approximately 11,000 rooms. Judging the "efficient use" of space remains subjective, but having current measurable information is making the process of space allocation go more smoothly. (Contains 3 tables and 13 references.) (SLD)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 457 748

The Role of Institutional Research in Space Planning: Helping all the Pieces Fit Together

Catherine E. Watt
Assistant Director

Ronnie F. Chrestman
Senior Statistician

Brian A. Johnston
Research Assistant

Clemson University
Office of Institutional Research
302 Sikes Hall
Clemson, SC 29634

864-656-0161
cwatt@clemson.edu

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

HE034401

BEST COPY AVAILABLE

Abstract:

IR offices can play a vital role in university master planning. No other office on a campus has access to so many pieces of the planning puzzle. The researchers' IR office has become the repository for all facilities information, course management, and research data. In this role, office staff have worked to collaborate on the academic plan, the space plan, and the long-range master plan of the University. Results of the initial planning stages suggest that more precise information is available more quickly and from a central location, therefore improving long-range facilities planning.

Introduction:

Offices of Institutional Research across the country manage a variety of data pieces and turn them into useful information for both internal and external constituencies. For most offices, information about space and its uses is usually not part of the picture. However, facilities management is a topic of concern for many institutions, large and small, as building costs escalate and lab space becomes a turf issue. Space is a resource that must be managed by someone, and Institutional Research personnel can play an important role. Over the past two years, one IR office has taken the basic facilities information and assisted in an institutional evolution – from one where space is departmental turf to one where space planning centers around achieving the University's ten year goals. Institutional Research has had the opportunity to not only take on a new task for the University, but to utilize existing databases in a way that improves information resources across campus.

Purpose

This article presents the results of a two-year, and still ongoing, initiative at a land-grant research university to comprehensively analyze academic and administrative space. Administrative attitudes are compared with faculty attitudes related to space priorities, as the institution begins a comprehensive ten year plan that focuses on limiting its undergraduate growth while enhancing both its graduate and research programs. The plan calls for the University to grow, while state allocations are expected to remain stagnant. The Office of Institutional Research (OIR) serves as the central point for all quantitative information for the institution, and as such, presented three primary research questions when beginning the space study:

1. How is space usage currently distributed throughout the day and throughout the campus?
2. What is the relationship between research space, faculty, and research funding?
3. What are the current demands for space when matched with availability?

Answering these questions requires the use of several databases, including building files, course files, and personnel files. Only OIR has access to such a wide variety of information and the ability to present the data in an objective manner. This analysis also attempts to determine the best method for informing others about space change at the institution.

Space is defined in this study as assigned instructional, academic, or administrative areas. Auxiliaries, physical plant and student space are not primary concerns of this study, although that information is maintained in the comprehensive database. The design and allocation of residence hall space has other rules that are not part of the University's primary concerns.

Limitations of the Study

This research presents information that was collected at a specific point in time at a public University where financial and space allocations can shift annually. State financial allocations have been stagnant and are currently being cut 10-15%. Research funds have consistently increased, but individual departments have seen significant changes over the past five years. In addition, there may be some concern that auxiliaries and physical plant were not included since they affect the daily campus atmosphere. Because location and capacity of the physical plant represent the infrastructure of an institution, it is hoped that continued analysis could include physical plant.

Review of the Literature:

Research into space planning has sporadically come to the fore in higher education literature. As early as 1968, authors were attempting to suggest methods for comprehensively managing the vast complexes that make up American research universities. In the 33 years since, costs for conducting basic research have escalated much faster than inflation, particularly for institutions conducting research in biotechnology and engineering. These escalating costs, combined with the accountability and budget constraints facing most public institutions, once again brings space planning to the fore of higher education interests.

Changing Priorities

Most public institutions have been subject to the changes of state budgetary priorities over the past four decades, and facilities have ridden along the edge of the tide. In the 1960's, the federal government poured money into higher education, building new facilities to house all the first generation students now attending colleges and to finance research to keep up in the Cold War. The 1970's, however, saw a shift as federal support for higher education decreased and states were pressured to try and compensate for the decrease in funding. Uncertainty also arose because enrollments actually declined across several years, and there was a surplus of professorial candidates. With shifting monetary priorities, both faculty salaries and money for facilities became scarce (Pickens 1993). By 1980 the federal government had cut its support of university equipment and facilities by over 80%, and as state support increased, federal support continued to decrease (Bok 1982). The 1980's brought increased funds, due to dramatic tuition increases as well as increased state allocations, enabling administrations to increase faculty salaries after years of neglect (Boyer

1990, Pickens 1993). Monies were also used to supply the vast number of student services now required to support the students. To assess the success of students attending and paying the public institutions, the 1990's became the age of accountability, as approximately 35 states implemented some type of measure to make institutions more responsive to public concerns (Burke 2000).

Unfortunately, facilities maintenance, while sometimes reported to state coordinating boards, is rarely an issue that concerns either legislators or the public. Because of this, many institutions have seen their deferred maintenance postponed until the last possible minute and have been forced to watch as old buildings fall into disrepair and new ones become a rarity (Ehrenberg 2000, Pickens 1993). Renovations or new construction typically require an appeal to a state committee on capital costs; rarely can a public institution rely only on its own funds. Given the increased demands by students for technologically savvy campuses, costs for infrastructure have dramatically increased over the past decade and are expected to continue to rise (Fink 1997). Couple those costs with the internal demands that campuses lead the technology revolution, and there is legitimate cause for consternation when attempting to set space priorities. As far back as 1968, Bareither and Schillinger noted the importance of *campus* and not departmental needs, when describing space planning in terms of a mathematical model. The authors cite the importance of campus planning as a precursor to facilities planning, but this appears to be the kind of long-range planning not always available to public institutions administrators who must take what is available in each budget cycle.

As higher education moves into the 21st century, another debate continues – the impact and the potential for distance education, and the subsequent impact on educational

facilities. State plans, such as those for Florida, Maryland, Tennessee, and Virginia address the expanding need for higher education in more distant locations (SCHEV 1998, Florida Board of Regents 1999, MHEC 1999, THEC 2000). However, institutions differ widely on their dedication to this new technology, with most preferring to rely on others to fill the gap between tradition and innovation. There are conflicting views on the potential for distance education, but some believe as Fink (1997) states, "As advances in technology continue, the campus as a place diminishes in significance as the locus of knowledge" (p. 327). Actual figures seem to reveal a different tale since the majority of campuses across the country have seen an increase rather than a decrease in on-campus enrollment (*Chronicle* 2000), and while the merits of Fink's assessment are certainly debatable in regards to instructional space, the issue of research space continues to surface-- and continues to surface more often-- at large institutions as costs escalate with technological advances (*Chronicle* 2000).

To assess the impact of research space on research funding, at least two institutions have developed models on a square foot per research funding methodology. The Georgia Institute of Technology and Texas Commission on Higher Education have developed mathematical models by which they can approximate how many square feet of research space is needed to generate $1 million in research. The Georgia Tech model focused on a set of eight comparable institutions, chosen by the institutional administrators, and the consultants built models based on projected departmental growth. This was the first time that space needs had been assessed on a faculty need basis instead of a student need basis. As a result, administrators at Georgia Tech had a consistent measure upon which to assess program growth or decline, and could make decisions based on information rather than politics. Other

institutions seeking to increase their research money may try similar predictors, since competition over the top faculty has become quite costly.

Competition and Campus Politics

One of the unique characteristics of American higher education is the independence with which departments and faculty operate intellectually. Intellectually, faculty have the freedom to develop their own research and ideas: this freedom is the cornerstone of the American higher education system. Practically, most faculty are dependent upon the institution to provide structure and support for their research. The university has a commitment towards its faculty, and, in order to stay afloat as a center of research and learning, universities must strive to fulfill this commitment.

In his book *Beyond the Ivory Tower* (1982), Derek Bok notes the conditions that must be present to maintain the highest quality scientific research. Of his six conditions, two relate to space as follows:

> - First-rate scientists need proper instrumentation and facilities to permit them to do their best research. Without modern equipment, investigators will not be able to work at the frontiers of science, and the initiative will rapidly shift to other countries where better facilities are available.
> - The working environment should be such as to stimulate research of the highest quality.... And since all scientific discoveries build upon existing knowledge, investigators must have access to the widest body of scientific work by having excellent library facilities...and maximum freedom to exchange information concerning work in progress. (p. 143)

Being at the forefront of current research means having the facilities to produce, and that means being an institution where research gets much more (monetarily) than passing interest. In fact, it almost seems logical to suppose that only the richest institutions can afford to

compete for the scientists on the cutting edge of research. A recent article in *The Chronicle of Higher Education* (May 11, 2001) detailing the membership of the elite National Academy of Sciences supports this supposition. According to the article, 56% of the 2,285 members of the Academy come from only 30 institutions: institutions that receive 40% of the federal government's science and engineering funds and possess endowments that are among the largest in the country (Brainard 2001). Data from fiscal year 1999 reveals that the average endowment for each of these institutions was over $2.5 billion, more than enough to fully support Bok's ideal research environment. It takes more than one or two elite scientists to create a research institution; it takes money, cooperation, and specific intent. At least one of those is often in short supply at public institutions as we enter the 21st century.

Cooperation, or a lack thereof, is often cited as the reason for maintenance of the status quo across campuses. Academic departments are notoriously protective of their space, and have traditionally viewed administrative attempts to assess university space as intrusions upon sovereign territory. Although many would almost certainly say that this departmental protectiveness is not only justified but also necessary, the charged climate of fear and distrust that it creates has made a comprehensive assessment of university space a task that is difficult at best and acrimonious at worst.

For the purposes of this research, graduate assistants and staff visually and physically assessed every building on campus in order to verify the accuracy of past data collections. Often, faculty and administrators would stop them why they were there before inevitably explaining that the assessment was a waste of time. According to most faculty at the institution the administration's role in space management is not to assess space, or even to determine if existing space could be used more efficiently, the administration's role is, quite

simply, to provide more space. This attitude, which produces its own unique problems, was symptomatic of a larger campus attitude concerning space: the attitude that departmental space is private and that the university's overall policy of space management should be decidedly laissez-faire.

In the golden age of the forties and fifties when federal funding was still plentiful, a hands-off attitude towards space was not only logical but was preferable (Miller 1990). Today, however, such an attitude is not possible and universities can no longer afford to focus on the increase rather than the use of square footage. It would be ideal, of course, if an institution were able to create, and then adhere to, a deferred maintenance plan that anticipated the life cycle of both interiors and exteriors. However, when trying to decide between increasing faculty salaries and updating the air conditioning system, it is difficult to argue against salaries in favor of something that is still in working order. According to Ehrenberg (2000), this deferment is more hazardous and more costly than keeping up with maintenance needs, as anyone who owns a house knows how much it costs when one waits until a needed element is broken – it costs more and planning becomes impossible. Cornell is one example where deferred maintenance is now a priority, but some at the institution view this as money that could have been spent to keep tuition down or to increase faculty salaries. Cornell has only been successful because its board of trustees continually assesses the progress made and plans for additional maintenance (Ehrenberg 2000).

Methodology:

The First Pieces

In the summer of 1993, the Office of Institutional Research at this university constructed its first institutional facilities database. Over the course of several weeks, each building on campus was inventoried, and specific information was gathered about every structure and room on campus. Once the database was constructed, it was turned over to a group in the facilities department who took responsibility for updates until the office was restructured in 1995. At that time, the responsibility of updating the facilities database was given solely to OIR.

Over the past six years, OIR has performed three updates of the database. The first update, performed in the summer of 1996, consisted of a targeted spot check of all buildings on campus. The check, guided by a comparison between classroom assignments and room use codes, was effective at eliminating discrepancies between actual and recorded room use and function on a small scale. In 1999, it became clear that an update had to be performed on a larger scale, and OIR created and conducted an institutional survey (on paper) in which deans and department heads were asked to respond. The survey asked for information about room use and function, departmental control, square footage, number of stations, handicapped accessibility, and the types of hazards (biological, chemical, radioactive) that each room contained. Departments were asked to note if a room was no longer – or had come -- under their control, and to indicate the room and department in which the change had occurred. Since approximately 11,000 rooms were covered in the survey, and since time was limited by state commission demands and other external factors, OIR trusted the information that each department returned and used it to update the rooms file.

In the fall of 2000, the Office of the Provost requested a complete inventory of four major research and instructional buildings. During the initial assessment, it became clear that

some of the information contained in the facilities database was flawed, that departments had taken the 1999 survey lightly and had failed to re-compute assignable areas for sections that had undergone major renovations. Upon closer evaluation, it became clear that departments had also failed to re-check the number of stations assigned to large laboratories and classrooms, and had been, either intentionally or unintentionally, hiding space from the university. In order to combat these problems, OIR conducted a full walking survey of every room on campus. Since the only major problems were assignable area computations, and since most of these were off by a few feet only, the survey was used to begin an assessment of the working equipment contained in each room such as hoods, gas vacuum and air lines, smart projectors, and special lab setups. The result of this study has been a facilities database that is not only accurate but is regularly updated with each discovery of new information.

While the rooms file contains individual space and its available square footage, the building file is also an integral part of this project. This file contains all information that pertains to the general structure and welfare of each building on campus. Among other things, the file reports the annual maintenance costs, rehabilitation costs, replacement costs, overall condition, and projected cost of any major renovation that the University may have to perform. Many of these items are reported annually to both the Commission on Higher Education and to the University's insurance company. Unlike the rooms file, which is entirely maintained by OIR, the building file is updated annually by the Property Appraisal Unit of the Division of General Services. The building file and the rooms file can be linked with additional information through the building identification number.

One of the important aspects of this project has been the updating of the University blueprints. OIR had copies of all plans, and as changes were discovered on the walking

survey, changes were made to the blueprints to keep them updated. While the drawings have not been shared across campus, they are available upon request and are shared with the Chief Facilities Officer. The master planners, currently on contract with the University, will provide a complete set of professionally updated plans to OIR, enabling the office to have even better information.

Examples of Analyses:

Given all the data available to OIR, there are many ways to put the pieces together. Individual departments rarely request space information, but numerous requests come from the deans' offices and the Provost's office. For example, when student affairs planned on changing the hours of one of the small cafés on campus, a question came up related to the flow of students in that area over the course of the day. The following chart is an example of how OIR assessed student counts in each of the four major classroom buildings in the area:

Student Counts by Building and by MWF Class Times				
MWF Start Time	**Brackett Hall**	**Daniel Hall**	**Lowry Hall**	**Sirrine Hall**
8:00 AM	243	810	98	388
9:05 AM	723	1084	171	708
10:10 AM	631	1076	149	680
11:15 AM	588	1303	68	524
12:20 PM	630	728	22	611
1:25 PM	533	935	94	350
2:30 PM	4	169	28	0
3:35 PM	0	29	0	0

One of the conclusions drawn from this simple assessment was that the café could close by 4:00 with little impact on the students who use the café. Following this simple example, there are other methods for utilizing space data. Given the above information, for example, OIR can assess the same data for the summer sessions, to assist Student Affairs staff with determining if student flow changes enough in the summer to warrant leaving the café open.

To further exemplify the types of analyses of interest to research institutions, the example below details research expenditures for the College of Engineering per square foot of noted space. This information, when assessed longitudinally, assists the institution in determining how much space a new research professor needs to generate a certain amount of research funding. One must keep in mind that this information will differ greatly across disciplines.

FY99 Research Dollars per Square Foot

Dept Code	Department Name	Assignable Area	Research Dollars	Total Research Dollars per Square Foot
905	Bioengineering	15,309	$1,323,767	$86.47
909	Chemical Engineering	17,706	$741,968	$41.90
911	Civil Engineering	22,837	$1,818,478	$79.63
915	Electrical & Computer Engineering	30,043	$4,280,344	$142.47
919	Environmental Engineering	25,192	$1,951,708	$77.47
920	Industrial Engineering	8,925	$469,255	$52.58
921	Mechanical Engineering	81,404	$2,490,461	$30.59

As space at the institution becomes more of a campus issue and less of a departmental issue, summary information such as the above can be used in multiple planning environments.

When planning for new space, or renovations, an assessment can be done with more detail than in the chart above, where space and research dollars are merged with the type of space:

Breakdown of Research Space by Room Use

NOTE: "% of total" represents the percentage of department research space in each category. Classrooms are not part of this analysis.

Dept Code	Department Name	Research Dollars	Open Labs	% of Total	Research Lab	% of Total	Offices	% of Total
905	Bioengineering	$1,323,767	0	0.0%	11,140	72.8%	4,169	27.2%
909	Chemical Engineering	$741,968	3,756	21.2%	6,676	37.7%	7,274	41.1%
911	Civil Engineering	$1,818,478	4,070	17.8%	7,378	32.3%	11,389	49.9%
915	Electrical & Computer Engineering	$4,280,344	2,277	7.6%	14,277	47.5%	13,489	44.9%
919	Environmental Engineering	$1,951,708	0	0.0%	16,369	65.0%	8,823	35.0%
920	Industrial Engineering	$469,255	2,315	25.9%	1,507	16.9%	5,103	57.2%
921	Mechanical Engineering	$2,490,461	4,889	6.0%	46,490	57.1%	30,025	36.9%

A dean could use this information to note departments where there is significant space allocated to "open labs," a notation where one is not assigned to a specific faculty member. It is hoped that over the next year, OIR will be able to link a person to each room, including all of a faculty member's research space. The individual is not currently part of the system, only the department identifier. This year has been the first where this kind of detailed information was available, and as expected, the reaction to questioning space usage has been mixed.

Of course, one issue that has not been resolved is the best method for forcing someone to give up space when the faculty member has not fully utilized a laboratory for a few years. The OIR staff observed several occasions where lab equipment appeared to have been unused for quite a while, and this occurred in departments where others claimed a need

for additional space. Again, however, OIR has the ability to provide information about more than just space and more than just research; there is the ability to also merge teaching load, committee load, and public service load, therefore providing a fuller picture of workload. Some have attempted to use this information to try and assess efficiency, the most elusive of conclusions to draw.

Conclusion:

Judging the "efficient use of space" remains subjective. This institution has determined that departmental sovereignty over space can create problems with updates and take significant staff time. However, having *current* measurable information has made the process go much smoother, and results can be seen across campus. Higher education professionals realize that space planning issues will only intensify as time and budget constraints continue. Because of this, the importance of an established methodology for assessing institutional space cannot be overemphasized. It is clear that institutional research staffs have a great deal to contribute to the administrative management of university facilities. By utilizing the resources that are available through institutional research, new information can be made readily available to faculty and staff. Examples include current issues such as retirements, hiring junior faculty, and increasing research; issues where institutional research expertise can assist with planning for the institution's future.

Changing the way an institution thinks about space and the allocation of space is a long-term process. It would be extremely difficult and inappropriate to assume the space mold for one campus can just be transferred to another institution. Each school must take into account its unique role and mission, and especially the academic plan that leads each

into the 21st century. Allowing Offices of Institutional Research to have continuous access to a facilities database can benefit all decision makers at an institution.

Works Cited

1998 – 2003 SUS Strategic Plan. (1998, Nov. 18). Tallahassee, FL: Florida Board of Regents. Retrieved May 20, 2001, from the World Wide Web: http://www.borfl.org/borpubs/strategicplan/pg_1.asp

Bareither, H.D., & Schillinger, J.L. (1968). University Space Planning: Translating the Educational Program of a University Into Physical Facility Requirements. Chicago, IL: University of Illinois Press.

Birnbaum, R. (1988). How Colleges Work: The Cybernetics of Academic Organization and Leadership. San Francisco, CA: Jossey-Bass Inc.

Bok, D. (1982). Beyond the Ivory Tower: Social Responsibilities of the Modern University. Cambridge, MA: Harvard University Press.

Boyer, E.L. (1990). Scholarship Reconsidered: Priorities of the Professoriate. Princeton, NJ: Princeton University Press.

Distance Education in Maryland Colleges and Universities. (1999, March). Annapolis, MD: Maryland Higher Education Commission. Retrieved May 20, 2001, from the World Wide Web: http://www.mhec.state.md.us/Distance/DESurv99/distsurv.html

Ehrenberg, R.G. (2000). Tuition Rising: Why College Costs So Much. Cambridge, MA: Harvard University Press.

Fink, I. (1997). Adapting Facilities for New Technologies and Learners. In M.W. Peterson, D.D. Dill, & L. A. Mets (Eds.), Planning and Management for a Changing Environment (pp. 319-339). San Francisco, CA: Jossey-Bass.

Kaynor, R. (1993). Using Executive Information Systems to Manage Capital Projects and Facilities. New Directions for Institutional Research, 77. (1), 79-88.

Miller, R.I. (1990). Major American Higher Education Issues and Challenges in the 1990s. London, England: Jessica Kingsley.

Pickens, William H. (1993). Measures of Resource Scarcity in Higher Education. In William B. Simpson (Ed.), Managing with Scarce Resources (pp. 5-15). San Francisco, CA: Jossey-Bass.

SCHEV 2000 Annual Report. (2000, Nov. 6). Richmond, VA: State Council of Higher Education for Virginia. Retrieved May 20, 2001, from the World Wide Web: http://www.schev.edu/schevhome.html (pdf document).

Statewide Master Plan for Tennessee Higher Education 2000-2005. (June 2000). Nashville, TN: Tennessee Higher Education Commission. Retrieved May 20, 2001, for the World Wide Web: http://www.state.tn.us/thec/new_pub.html (pdf document).